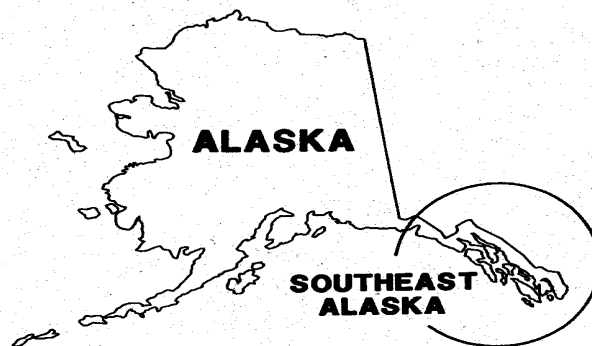
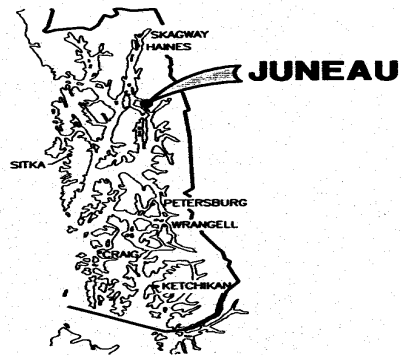


Going Cold Iron In Alaska

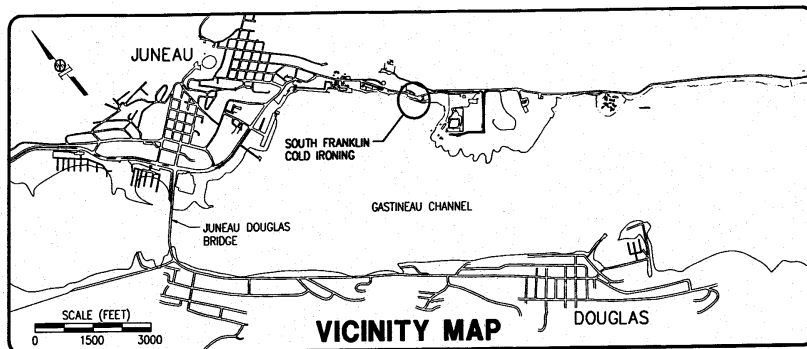


LOCATION MAP



SOUTHEAST ALASKA

JUNEAU, ALASKA SOUTH FRANKLIN COLD IRONING 2001



[illegible]

A photograph of a large industrial transformer or power equipment situated outdoors near a body of water. A blue truck is parked in the foreground, and a crane is visible on the left. The background shows a river and hills.

Sub Station



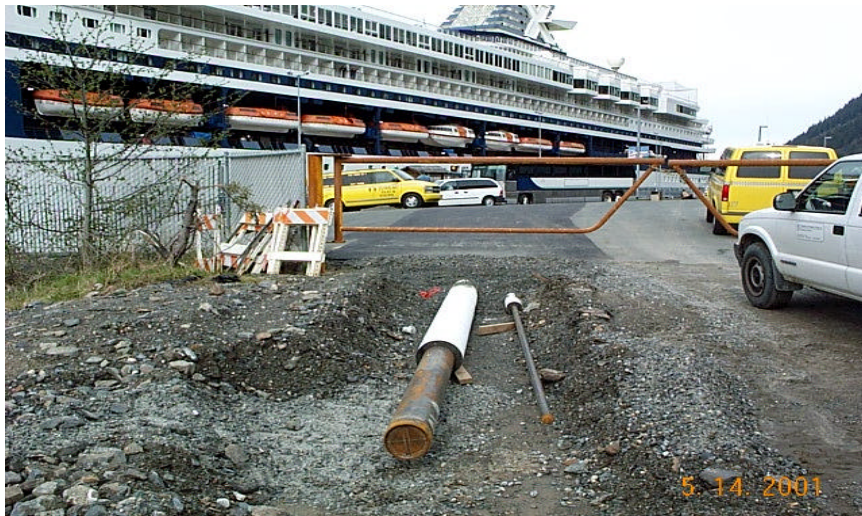
Cable/Steam Pipe Trench



Tunneling Under Road



Steam/Condensate Return Pipes



Dockside Conduits



Boiler Building Foundations



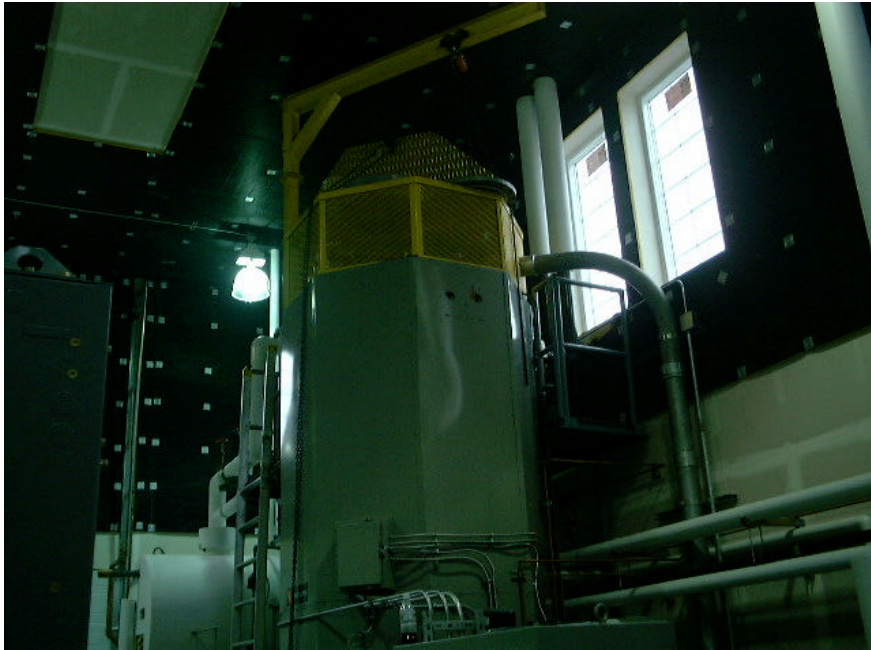
Boiler Building





Boiler and Ancillary Equipment





Dock Switch & Gantry



Gantry



Part 2

Shipboard Work



Plugs Onboard



Connecting the plugs



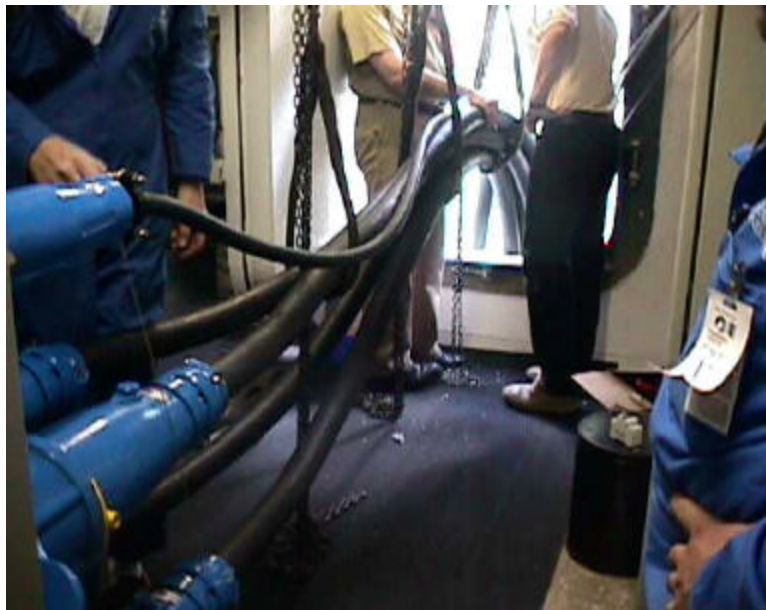
Securing Plugs



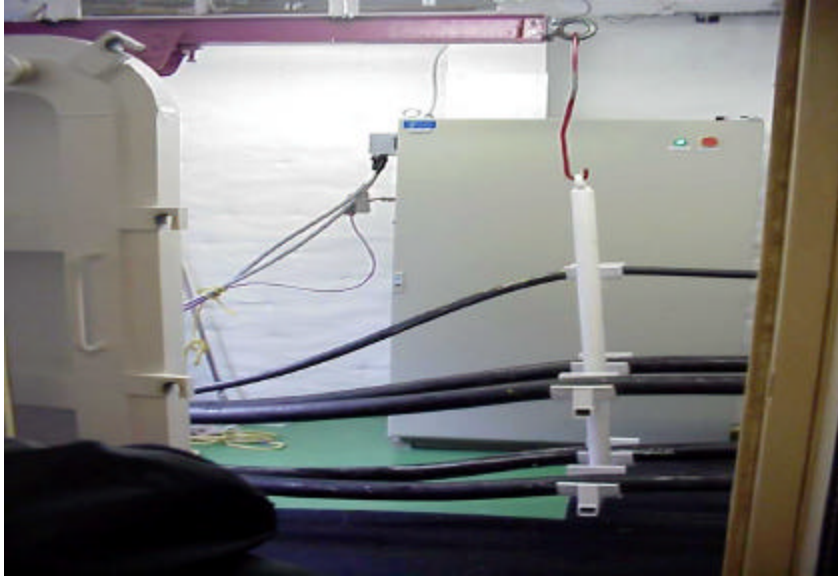
Connected



Temporary Cable Support



Cable Supports



DOCK WATTS LLC

April 20, 2004

LARGE COMMERCIAL SHIP EMISSIONS**OPERATIONS ASSUMPTIONS**

	Port Call Frequency	Port Calls Per Year	Average Hours in Port	Estimated Hours per Year	Average Electric Load	
	Days				MW	MWh/Year
Container Ship	45	8	60	467	2,000	933
Tanker Ship	15	23	24	560	4,000	2,240
Cruise Ship	7	25	12	300	7,000	2,100

EMISSIONS FACTORS (grams/kWh)

	NOx	SOx	CO2	HC	PM
Marine Aux Generators, Diesel Fuel Oil	13.9	1.1	690	0.4	0.3
Marine Aux Generators, Residual Fuel Oil	14.7	12.3	722	0.4	0.8

* Data Source: July 2002 ENTEC study for the International Maritime Organization
Assumes auxiliary generators are medium speed engines

EMISSIONS FACTORS (lb/MWh)

	NOx	SOx	CO2	HC	PM
Marine Aux Generators, Diesel Fuel Oil	30.580	2.420	1,518.0	0.880	0.660
Marine Aux Generators, Residual Fuel Oil	32.340	27.060	1,588.4	0.880	1.760
New Power Plant (2x1 F Comb Cvc, nat gas)	0.126	0.008	151.741	0.069	0.026
2x1 F compared to Marine Aux Gen, Diesel	0.41%	0.31%	10.00%	7.79%	3.92%
2x1 F compared to Marine Aux Gen, Residual	0.39%	0.03%	9.55%	7.79%	1.47%

* 2x1 F emission based on Siemens Westinghouse 501 F gas turbines

SHIP EMISSIONS IN PORT (Tons/Year)

	NOx	SOx	CO2	HC	PM
Container Ships Aux Generators, Diesel Fuel Oil	14,271	1,129	708.4	0.411	0.308
Tanker Ships, Diesel Fuel Oil	34,250	2,710	1,700.2	0.986	0.739
Cruise Ships Aux Generators, Diesel Fuel Oil	32,109	2,541	1,593.9	0.924	0.693
Container Ships Aux Generators, Residual Fuel Oil	15,092	12,628	741.3	0.411	0.821
Tanker Ships, Residual Fuel Oil	36,221	30,307	1,779.0	0.986	1.971
Cruise Ships Aux Generators, Residual Fuel Oil	33,957	28,413	1,667.8	0.924	1.848

DOCK WATTS LLC

April 20, 2004

SHORE POWER ROUGH ECONOMICS

Port Electric Infrastructure Cost	\$2,500,000	per Terminal
Ship Electric Infrastructure Cost	\$300,000	per Ship
Ships Retrofitted Per Terminal	1	

Initial Capital Cost per Berth **\$2,800,000** Includes cost of retrofitted ships and Port infrastructure

	NOx ton/year	SOx ton/year	HC ton/year	PM ton/year	total ton/year	CO2 ton/year
Container Ships Aux Generators, average of fuels	14.7	6.9	0.4	0.6	22.5	724.8
Container Ship emissions over 10 year period	146.8	68.8	4.1	5.6	225.4	7,248.3
Cost Effectiveness (\$/Ton)	\$19,072	\$40,706	\$681,818	\$495,868	\$12,425	\$386
Tanker Ships Aux Generators, average of fuels	35.2	16.5	1.0	1.4	54.1	1,739.6
Tanker Ship emissions over 10 year period	352.4	165.1	9.9	13.6	540.8	17,395.8
Cost Effectiveness (\$/Ton)	\$7,947	\$16,961	\$284,091	\$206,612	\$5,177	\$161
Cruise Ships Aux Generators, average of fuels	33.0	15.5	0.9	1.3	50.7	1,630.9
Cruise Ship emissions over 10 year period	330.3	154.8	9.2	12.7	507.0	16,308.6
Cost Effectiveness (\$/Ton)	\$8,476	\$18,091	\$303,030	\$220,386	\$5,522	\$172

DOCK WATTS LLC

April 20, 2004

Average Auto Emissions Factors (CARB)

Based on 12,000 miles/year

	NOx	HC	PM	CO
grams/vehicle mile	0.686	0.523	0.218	6.190
lb/year per vehicle	18.110	13.807	5.755	163.416
lb/day per vehicle	0.050	0.038	0.016	0.448

Marine Diesel Fuel

Ship equivalent vehicles per day

	NOx	HC	PM
1.0 MW	14,792	558	1,005
2.0 MW	29,583	1,117	2,009
3.0 MW	44,375	1,675	3,014
4.0 MW	59,166	2,233	4,018
5.0 MW	73,958	2,792	5,023
6.0 MW	88,749	3,350	6,028
7.0 MW	103,541	3,908	7,032
8.0 MW	118,332	4,467	8,037
9.0 MW	133,124	5,025	9,041
10.0 MW	147,915	5,583	10,046

Marine Diesel Fuel

Ship equivalent vehicles per day

	NOx	HC	PM
1.0 MW	15,643	558	2,679
2.0 MW	31,286	1,117	5,358
3.0 MW	46,929	1,675	8,037
4.0 MW	62,571	2,233	10,716
5.0 MW	78,214	2,792	13,394
6.0 MW	93,857	3,350	16,073
7.0 MW	109,500	3,908	18,752
8.0 MW	125,143	4,467	21,431
9.0 MW	140,786	5,025	24,110
10.0 MW	156,429	5,583	26,789

Components of Dock Watts

